REMARKS

This amendment is in response to the Office Action mailed August 16, 2000. Claims 1-15, 18, 20-25 and 29-50 were rejected in the Office Action. After amendment, Claims 1-3, 5-15, 18, 20-25 and 29-50 remain pending and reconsideration of the rejection of these claims is respectfully requested.

It was noted in the Office Action that the Oath/Declaration was missing the statement that this Application is a continuation in part of co-pending application number 09/031,108. A new Declaration is being prepared for execution and will be submitted in the near future.

Applicants noted that on the Office Action Summary sheet, Claims 1-15, 18, 20-25 and 29-50 were identified as rejected. In the Detailed Action, however, only claims 1-3, 5-21, 23-31, 34, 37, 38, 40-42 and 47-49 were listed in the detailed discussion of the rejections. In addition, Claim 21 was mentioned in the body of one of the rejections. Thus, Claims 4, 22, 32, 33, 35, 36, 43-46 and 50 were not discussed in the Detailed Action. Therefore, it is not understood if these claims were rejected and, if they were, on what basis.

Claims 10 and 23 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 10 and 23 have been amended to clarify that which is claimed. Reconsideration of the rejection of Claims 10 and 23 is respectfully requested.

Claims 1-3, 5-9, 11-15, 18, 20, 23 and 47-49 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '811 in view of Bruyneel et al.

Applicants respectfully disagree with this rejection. First, the combination is not proper as JP '811 is directed to a balance or compensation rope. This is clear from a review of the full translation (provided herewith). Although the term 'hoist rope' is used once, the description of the rope is of a type of "ribbon form rope". Further, this rope is described as one that 'hangs in the lower portion for connecting elevators that may be

ascending/descending alternately", i.e., a balance or compensation rope. Still further, the main objective of this invention is to make a rope the is flexible enough to overcome the tendancy to bulge and make contact with the walls. Tension members that provide lifting force to an elevator car are loaded and do not exhibit this tendency to 'bulge'. Therefore, it is obvious that the rope described in JP '811 is not a lifting rope, but is a compensation or balancing rope. The single use of the term 'hoist rope' is the result of the translation and clearly is not meant to imply that this rope is used as a tension member for providing lifting force to an elevator car.

As a result, there is no motivation to combine JP '811 with the fine wire elements of Bruyneel et al. Balance ropes, such as those described in JP '811, are used to shift weight between two moving elements (adjacent cars or a car and counterweight). There is no need to make the wires of a small diameter as claimed since this will add cost and complexity for no purpose. The balance ropes of JP '811 are used as mass and therefore having less expensive large diameter wires is sufficient for this purpose.

Second, the combination, even if proper, does not result in the invention as claimed. JP '811 is a balance rope and not a tension member as discussed above. In addition, Bruyneel et al. describes a rope having wire in a range from 0.15mm to 1.2 mm. The two examples in Bruyneel et al. have filaments in the range of 0.57 to 0.85 mm (example 1) and 0.20 to 0.29 mm (example 2). There is no disclosure or suggestion within Bruyneel et al. of a tension member formed from cords having all wires with a diameter less than 0.25 mm, as claimed in Claim 1. This feature ensures that the tension member will have sufficient flexibility for the elevator application, which requires repeated and frequent flexing as the tension member travels over sheaves. This element of the claim is not disclosed in either reference and the benefits of this element are not recognized or suggested. Therefore, the combination of JP '811 and Bruyneel et al. does not result in the claimed invention of Claim 1.

Applicants respectfully request reconsideration of this rejection of Claim 1 and Claims 2-3, 5-9, 11-15, 18, 20, 23 and 47-49, which depend from Claim 1.

As for Claim 21, which is discussed along with this rejection although not listed among the rejected claims under this rejection, the use of urethane is discussed in the specification. The coating layer must perform the required functions of traction, wear, transmission of traction loads and resistance to environmental factors. While other elastomers, such as natural rubber, may perform some of these functions, urethane has been found by the Applicants to be particularly effective, especially for its wear properties when it is used as the coating layer for a tension member in an elevator system. Many elastomers, such as rubber, provide adequate traction but do not provide adequate wear when subjected to the shear loads applied by the cords in an elevator application. Therefore, it is not a simple matter of design choice in selecting a material for the coating layer that will provide traction with the sheave while transmitting the traction loads to the cords and resisting wear and environmental factors in an elevator system.

Claims 1-3, 5-9, 11-15, 18, 20, 23-25, 29-31, 34, 37, 38, 40-42 were rejected under 35 U.S.C. 103(a) as being unpatentable over GB '209 in view of Bruyneel et al.

Applicants respectfully disagree with this rejection for similar reasons as discussed in response to the previous rejection. Claims 1 and 24 include the element of having the wires of the cords have diameters less than 0.25 mm. While Bruyneel et al. discloses that ropes could be made with wire diameters of a variety of sizes in a large range, it does not disclose or suggest having all of the wires with a minimum diameter for the purpose of improving flexibility. In addition, GB '209 discloses having a drive wheel that is approximately 100 times the diameter of the rope passing over it. While this may suggest having a thin rope, it does not recognize or suggest a motivation for making such a rope from small diameter wires. In fact, since the controlling parameter in GB '209 is the rope diameter, this reference teaches away from the claimed invention.

Therefore, Applicants respectfully request reconsideration of this rejection of Claims 1-3, 5-9, 11-15, 18, 20, 23-25, 29-31, 34, 37, 38, 40-42.

As mentioned previously, Claims 4, 22, 32, 33, 35, 36, 43-46 and 50 were not addressed in the detailed discussion of the rejections and therefore there is no response to the alleged rejection of these claims.

Inasmuch as neither the structure nor function of Applicants' invention has been anticipated or made obvious, Applicants respectfully request reconsideration and allowance of Claims 1-3, 5-15, 18, 20-25 and 29-50.

Please charge any deficiency in fees associated with filing this response to our Deposit Account No. 15-0750, Order No. OT-4355.

Respectfully submitted,

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METHOD FOR MANUFACTURING RIBBON-FORM ROPE

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References Cited: Japanese Kokoku Utility Model
No. Sho 31[1956]-19399

Japanese Kokoku Utility Model
No. Sho 31[1956]-10542

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4 others

[There are no amendments to this patent.]

Brief description of the figures

Figure 1 is an oblique view illustrating the [ribbon-form] twisted rope obtained in an application example of this invention. Figure 2 is a partially cut oblique view of a coated twisted rope [of wire] for forming the coated twisted rope.

Detailed explanation of the invention

This invention pertains to a method for manufacturing a ribbon-form rope composed of a plurality of twisted ropes set side by side and integrally embedded in rubber or synthetic resin to form the ribbon shape.

As a type of special rope, this type of ribbon-form rope has been used as hoisting rope or balance rope in elevators, etc. In order to eliminate the back-twisting tendency of the conventional twisted ropes, the twisted ropes are combined to form a flat belt structure. This type of ribbon-form rope is routinely used.

As an example, twisted ropes, each of which is made of four strands free of the core strand, are set side by side to form the longitudinal twisted rope group. Then, in the width direction, lateral wires are set and inserted through the core portions of the four-strand twisted ropes to form a knitted zigzag configuration as the ribbon-form rope. However, this knitting operation requires manual operation, and it has a low efficiency. When this method is adopted in manufacturing the long ribbon-form ropes for use in the elevators of pits of coal mines, much labor and time are needed.

Even when the aforementioned ribbon-form rope is manufactured with much man-hours, because lateral wires are used to knit the longitudinal twisted rope group, the longitudinal twisted ropes have to be made of four strands so that there is no core strand. As the twisted ropes have little strand gap and have a high rigidity, and they are knit tightly to each other, the obtained ribbon-form rope has poor softness and a very high rigidity. Consequently, when the ribbon-form rope is used as the balance rope that hangs in the lower portion for connecting elevators that may be ascending/descending alternately, the high rigidity leads to a tendency of bulging of the rope instead of the normal bending state. Consequently, the aforementioned bulging portion may make contact with the wall surface of the narrow pits of coal mines, leading to accidents of collapse of the wall surface of the pit, or, even when no accident takes place, it still causes unstable up/down movement of the elevators. This is undesired. Also, for the ribbon-form rope prepared by knitting with lateral wires, the lug portions of the lateral wires become the object of wear. Consequently, the lifetime of the ribbon-form rope becomes shorter. In this case, when on-site repair is performed, the aforementioned knit structure leads to significant difficulty in performing a complete on-site repair.

The purpose of this invention is to solve the aforementioned problems of the conventional technology by providing a type of ribbon-form rope characterized by the fact that it makes unnecessary the man-hours needed for the manual knitting operation, allows mass production, and permits selection at will of the flexibility, rigidity, and other properties as well as various specifications of the ribbon-form rope body. Also, the ribbon-form rope of this invention has a high wear resistance, a high corrosion resistance, and a long service life.

In the following, an application example of this invention will be explained with reference to figures. As shown in Figure 2, first of all, several steel strands are twisted in an S-twist or Z-twist to form a plurality of wire twisted ropes (1). For each twisted rope (1), the outer periphery is coated with a flexible material, such as rubber or a synthetic resin material to form coating layer (2), forming coated twisted ropes (3). Said coated twisted ropes (3) are aligned and set side by side with the S-twist and Z-twist arranged alternately, as shown in Figure 1. Then, each contact portion is bonded as explained below to form ribbon-form rope (4) with a specified width. That is, heat treatment is performed to soften coating layer (2), so that coated twisted ropes (3) are fused to each other.

As explained above, twisted ropes (1) can be prepared as the raw material from strands made of various materials and with different specifications. Also, the desired coating material may be selected for coating said twisted ropes (1) to form coating layer (2), forming coated twisted ropes (3). Then, depending on the requirements of the specific use, several groups of the twisted ropes are set side by side and bonded to each other by the aforementioned means. Consequently, it is possible to select the length, width and thickness of the ribbon-form rope as needed in manufacturing to form the desired ribbon-form rope. It differs from the aforementioned manual operation method in that the production is easy, mass production can be carried out, and the ribbon-form rope of this invention has higher wear resistance and corrosion resistance than the conventional products. Also, because twisted ropes (1) are laid only in the longitudinal direction of the ribbon-form rope body, and they are embedded integrally in the coating material. The ribbon-form rope of this invention differs from the aforementioned knit-type flat rope in that it has appropriate softness, flexibility, and rigidity. Also, as explained in the above, by selecting [properties] beforehand, the desired ribbon-form rope can be manufactured in a relatively easy way.

Also, because the ribbon-form rope is formed by setting the coated twisted ropes with their twisting directions arranged alternately, the back-twisting tendencies of the neighboring wire twisted ropes cancel each other, so that the internal stress of the ribbon-form rope can be eliminated.

Claim

A method for manufacturing ribbon-form rope characterized by the fact that it is comprised of the following steps: a step in which a layer of rubber, synthetic resin or other flexible material in a specified thickness is coated on the outer layer of twisted ropes of wire to form coated twisted ropes; and a step in which the coated twisted ropes are set side by side in contact with each other, with the twisting directions of the twisted ropes of wire set alternately, and the contact portions are fused to form a ribbon-form body with the desired width and length.

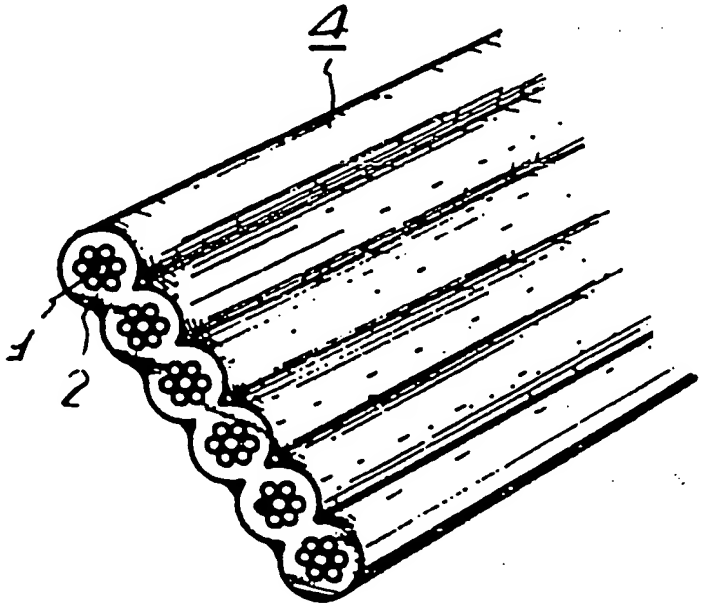

Figure 1

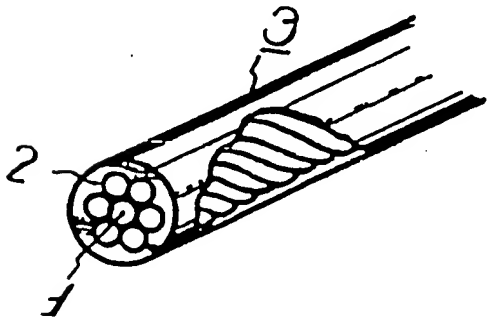

Figure 2